QUARTERLY

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CALIFORNIA GENTLEMAN, 1834-46



"EL HACENDADO Y SU MAYORDOMO" (the owner of the *hacienda* and his overseer): Tinted lithograph by Carlos Nebel, Mexico *ca.* 1839, showing costumes of a sort worn also in California.
From the Coronel Collection

CALIFORNIA COSTUME OF THE 1830's-1840's

Part I—Men's Dress

Alta California was, in a sense, an orphan in the early days. It was a wild land, remote from the capital of Mexico. Travel was slow by sea, and even slower by land. The people who lived in Upper California soon began to think of themselves as *Californios* rather than Mexicanos. But in spite of this apparent alienation the Californios ate the same foods, followed the same customs, and lived in much the same manner as their kin in Old Mexico. In the matter of clothing they were rather provincial, and dressed from ten to twenty years behind the times. One Mexican official arriving in Alta California in the early decades of the 19th century commented on the dress of the people, saying that it reminded him of the clothing worn in the days of his youth.

Among men of California during the period 1800-34, the short trousers of good broadcloth, silk or velvet were in vogue. At the opening of the century these were rather tight

fitting at the knee, but during the next thirty years they became looser. Such trousers were trimmed with silver or gold braid; and on the outer seam just above the knee, four or six silver buttons were sewn along a slit about six inches long. Usually these buttons were merely ornamental, and only the two top buttons had buttonholes that could be used.

No belts or suspenders were then worn, so the trousers were fashioned to fit snugly at the waist and were laced at the waistband in the rear.

Wide, red silk sashes were worn, not so much for mere adornment as to protect the abdomen while riding saddle, and to serve as a pocket or pouch. Tucked into the sash were the flint and steel, corn husks and tobacco for cigarettes, the occasional buckskin money-purse, or a belt gun. Sashes were from nine to ten feet in length and about eighteen inches wide, and sometimes were finished with long gold fringes. They were tied slightly to the rear over the left hip and the ends were never left dangling down the side too far, lest they become a nuisance while riding along brushy trails, or get entangled in the huge spurs which sprouted from the heels of every *caballero.*

Jackets of this period were short, with low collars except when the wearer wished to ape the military; then the collar would be rather stiff, and of a solid colour contrasting with the colour of the body of the garment. Jackets were made of the same fabric as the trousers—in broadcloth or linen, silk or velvet, sometimes cotton. Green, blue, black and yellow were favorite colours. The backs and fronts of the jackets were ornamented with elaborate scrollwork, usually in a floral pattern, worked in silver or gold thread on finer garments, or in white tape on those of more everyday sort. The buttons were generally of silver, and might be small round balls attached to short chains, or harp-shaped and fancier, or even fashioned with lion heads in low relief.

Speaking of the costumes of this period, Don Antonio Franco Coronel said: "The women made all the clothing for the priests and their husbands and brothers, and it was exacting work, for the cloth jackets were sometimes embroidered, stitched and trimmed with fringe. The vests which were generally made of silk or cloth also had to be well stitched and embroidered with coloured silk thread. The short breeches also had to have some stitching and the button holes worked."

Underneath the short trousers were worn white linen drawers which fell just below the knee. It was the height of fashion to keep the sides of the trousers open, in order that these *calzones* might be seen. Coarse ribbed woolen or cotton stockings were worn, and these were permitted to sag and wrinkle. Fashion decreed that men should have everything loose and free about the legs.

Wrapped around the legs were soft leather leggings called *botas,* made of tanned bearskin. Frequently these were pinked and embroidered with silk, gold, silver and hemp thread. The patterns were ornate, and a really good pair of *botas* often cost $200 to $300. Many of the best ones were made in Mexico; but others were fashioned locally, on the ranchos and in the mission workshops.

Men's shoes were low, slipperlike affairs with soft uppers of buckskin or dark velvet. They were without heels, or at best had very low heels, and they were often adorned with embroidery and tiny sequins.

Shirts were usually of white cotton or linen, with full sleeves and low collars, the bosom often lavishly embroidered with floral motifs. Around the neck men wore gaily coloured kerchiefs. Another kerchief of black silk was usually worn over the hair, tied in a knot at the base of the skull or at one side.

As an overcloak, men wore either the *serape,* a tightly woven garment in gay colours, or the *capa.* The best of the *serapes* were made at Saltillo and San Miguel de Allende, in Mexico, and often cost into the hundreds of dollars. Some were woven without slit



CALIFORNIA *VAQUERO* (COWBOY), 1800-34

This and the Front Cover *are from a series of eighteen-inch figures modeled for the Museum by Diana Bovee.*

openings for the neck, and these were usually called *jorongos*. The type with a neck opening was termed a *boca manga* — a word meaning "mouth and sleeve," which aptly described the garment. When a man slipped it over his head the sides fell down his body, giving the effect of wide, loose sleeves. The *serape* was the favorite garment of the men, serving by day as a protection against the cold or rain and becoming a bed-covering at night.

The *capa* or *manga,* also worn in California, was a handsome cloak with rounded edges but otherwise made like the *boca manga.* It was of fine broadcloth usually solid black, dark blue or dark green and with an insert of velvet at the neck-hole. The *capa* was ornamented with wide bands of gold or silver galloon and with gold and silver pendants, and lined with gaily figured calico. Calico or chintz was also favoured for the linings of jackets, trousers and vests, and was even used on the underside of the broad-brimmed hats.

The *capa* was a sign of the gentleman, and the wealthier the man, the handsomer his cloak. But it was said that nearly every man in California appeared well dressed at *fiesta* time. A man might have as much as a thousand dollars on his back, though not a dime in his pocket.

Men's hats were of black or light grey felt, with broad brims either stiff or flexible. The low crowns might be flat or domed, the latter shape being known in Mexico as *panza de burro* (burro's belly). There were no tall, peaked hats of the type known today as the *jarno del charro.* Toward the 1840's however, probably due to French influence in fashions, there appeared hats with slightly taller crowns, made in the form of truncated cones and looking like small inverted flowerpots.

In the year 1834 the brig Natalia and the corvette Morelos arrived in San Diego harbor with members of the Hijar colony on board. The men of this party were dressed in the height of fashion then prevailing in Mexico, and the trousers they wore were full length, open from ankle to hip on both legs and secured with dozens of small silver ball buttons. Such trousers had been in vogue in Mexico since about 1822, but had not been seen here before. After 1834 these long *calzoneras,* as they were known, became the fashion in Alta California too. This was the only important change in men's apparel during the long period 1800-1846. There were modifications in the hats, but the jackets and sashes, shirts, shoes and *botas* remained about the same. As for the *botas,* these leggings were still secured



TWO CALIFORNIA GENTLEMEN, 1834-46: The figure at left wears a broadcloth *capa,* trimmed with gold galloon and with green velvet insert at the neck. His hat is the type known as *de la panocha.* Both figures show the *botas* in the slits of the trouser legs.

From a watercolour sketch by Diana Bovee

to the leg underneath the newer long trousers. Today, at fiestas and parades we see men dressed in what they fondly imagine are replicas of Old California costumes, showing pleats of red, yellow or green silk or satin inserted at the slashed bottoms of the bell-bottom velvet trousers. These patches of coloured cloth are all that remain of the once handsomely embroidered *botas,* pride of the *Californios* of yester year.

In the Museum collections there is a series of eighteen-inch model figures wearing the traditional garb of early California. One of these, shown here, represents a *vaquero* of the period 1800-1834, dressed in the earlier short clothes and carrying his *reata.* Another shows a gentleman of the late 1830's and early '40's, wearing long *calzoneras.*

—ARTHUR WOODWARD

Part II of these notes, in the next issue of the *QUARTERLY,* will describe how the women of California dressed during the same period.

A MEXICAN STANDARD MEASURING STICK FOR THE *VARA*

Into the Americas in the early 16th century, the Spanish introduced a unit of lineal measure known as the *vara*. From those early days until the mid-1890's the *vara* was everywhere employed for surveys, in accounting records, and in descriptions of the many new wonders seen by the Spaniards. It measured 33.36 inches, being therefore a near equivalent to the English yard (36 inches) and the meter (39.37 inches). Mexican authorities abandoned the *vara* about half a century ago, when the Metric System was adopted.

Notwithstanding the constant references to the *vara* in Spanish records of many kinds, we cannot find that a concrete example of this measure has ever been described. So we are most fortunate to be able to show such a piece, used as a standard of measure in Arizpe, Sonora, Mexico from the 1830's to the '90's and presented to the Museum within recent months.*

The donor of our *vara* secured it from his friend Señor Ignacio Pesqueira, past *presidente* of Arizpe, who kindly supplied data concerning this fine example. We learn that it was owned by Don José Santiago García, a merchant of Arizpe in the early 1800's. From him it passed to a son, Don Santiago García, who was a great-grandfather of Ignacio Pesqueira. It was found by Señor Pesqueira among other possessions of his grandmother.

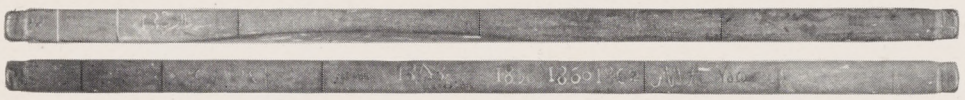
The wood used for our *vara* is *guaiacum* (lignum vitae), from a tropical American tree yielding a dense, heavy wood much prized for mallet heads, gavels, casters for furniture, and even sculpture because of its close-grained texture and range of colors through yellow, brown and green. In our *vara* the wood is of a rich chocolate color. Highly resistant to wear and decay, lignum vitae was very suitably chosen for a measuring-stick of this sort.

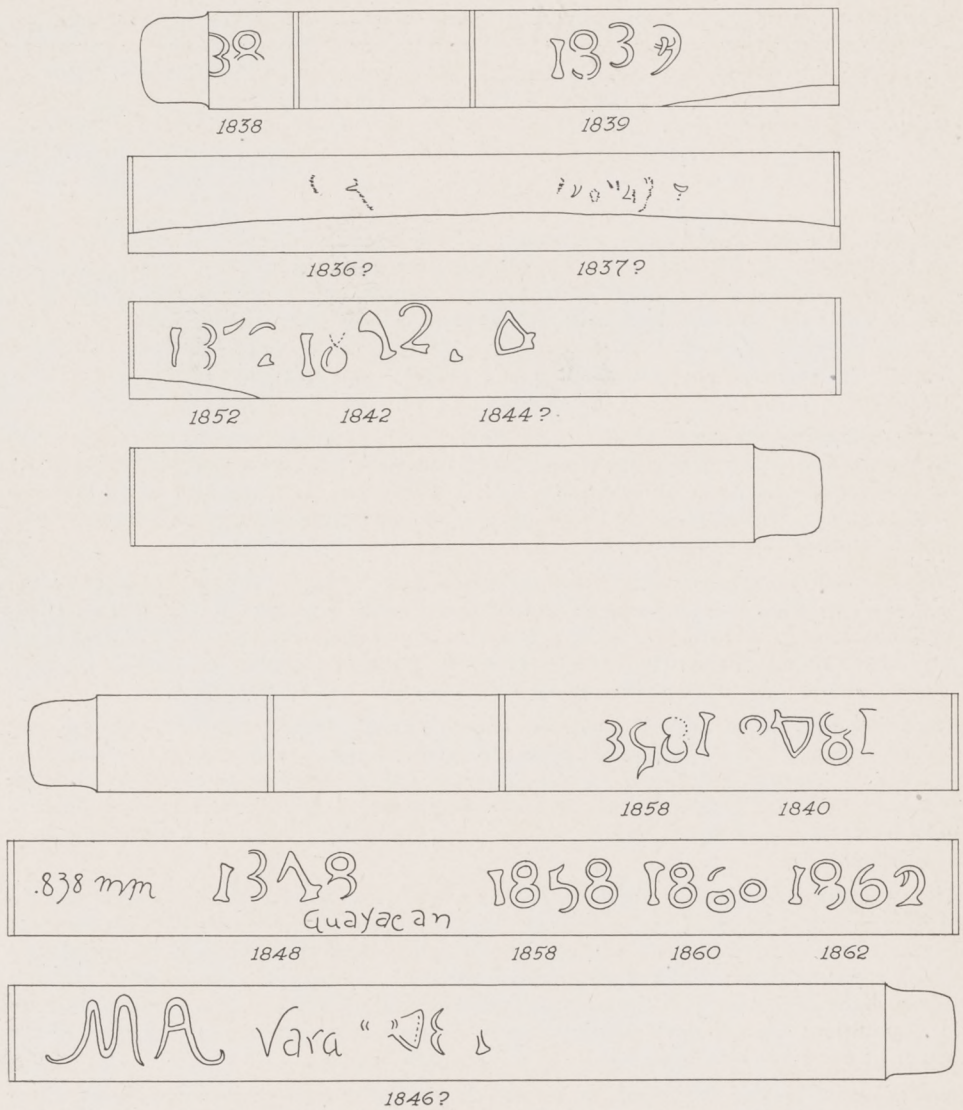
The *vara* was determined by totaling the distance of four spans of the hand, from the tip of the thumb to the tip of the little finger. Our stick actually measures 32⅞ inches long, instead of the prescribed 33.36 inches; but allowance should be added for the metal caps which apparently once finished the ends of the stick, protecting it from wear. At any rate, a slight deviation from the absolute standard need not disturb us too much. Perhaps local traditions allowed some difference from the usual measurement for the *vara;* or the maker of our stick may have followed an inaccurate model.

Nowadays, of course, the length of a meter is fixed with infinite precision, being taken from the "perfect" model of a platinum-iridium bar kept always at 0° Centigrade. But

*Accession number A.5728, the gift of Mr. Warren V. Harris.

Both faces of measuring-stick, showing the *vara* divided into quarters and thirds.





Drawing to show inscriptions on both faces of the measuring-stick: *above*, the face divided into quarters; and *below*, the face marked in thirds.

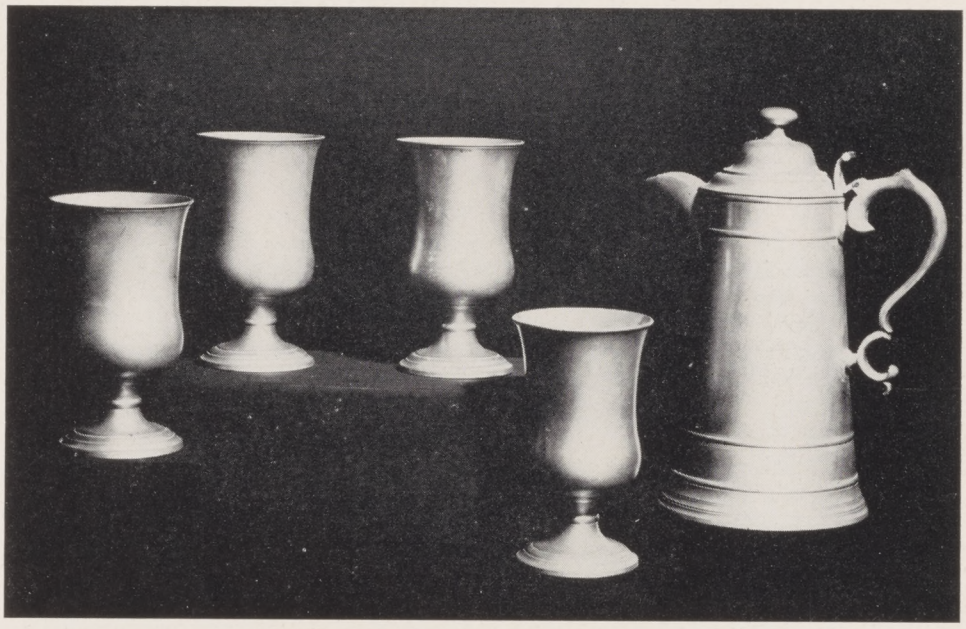
in earlier times there was no such constant guide. Careless inequalities appear in our *vara*, moreover, where one face is marked into quarters, the other into thirds. The alleged "quarters" vary from 8⅛ to 8 5/16 inches, and the "thirds" are 10 13/16, 11 and 11 1/16 inches. Two of these division-markings, toward the end of one face, are lines of inlaid bone. Originally, perhaps, all these markings may have had similar bone inlay. The meaning of some shorter subdivisions at one end of either face, in addition to the third- and quarter-markings, is not clear.

The letters *MA* (for the Municipality of Arizpe) and numerous dates, many of them indistinctly worked or almost worn away, are impressed on both sides of our *vara*. The dates are validations of the *vara* as a standard of lineal measure for the particular year, made by the Mexican Inspector of the "Oficina del Fiel Contraste" (Weights and Measures). These dates range at least from 1838 to 1862. On the face divided into quarters (placed between the 1839 and 1852 dates) are indistinct marks which may be for 1836 and 1837. There are no validations after the year 1862, though we are assured by Señor Pesqueira that this *vara* continued in use as the standard until about 1895 when the Metric System was introduced.

In the deeper figures there is indication of charring of the wood, suggesting that the dates were branded; and flecks of a white material in some of the numbers may mean that they were once filled with a pigment. Three notes have been added by Señor Pesqueira, in black ink: *.838 mm,* the name *Guayacan* (Spanish for guaiacum, or lignum vitae), and *Vara.*

The sketches here shown, from both faces of our *vara,* are based on rubbings made in order to bring out some of the details more clearly. The piece itself is to be seen in the Hall of California History, together with a leather *cordel* (surveyor's cord) used in this area during the Rancho period. Since the *vara* was standard measure but a short distance from our own region, undoubtedly the same or a similar measure was in use in Alta California.

—R. M. Ariss



Communion Service by William Calder
Providence, Rhode Island, the early 1830's

"POOR BUT PROUD"

With the English Silver collections of the Museum, there is to be seen a large Charles IInd flagon,[1] magnificently chased and gilt, made in London nearly three centuries ago (hall-marked 1664-5). And near by, looking far less showy but quite as noble, there is a silver chalice and paten of 1717-18 (here pictured) which we might well suppose was made for one of Sir Christopher Wren's fashionable London churches.[2] Excellent examples these both are, the flagon from a more pretentious, and the chalice from a very restrained period of work.

In the hierarchy of church communion plate, our William Calder service of a flagon and four thistle-cupped chalices[3] can claim no place among such early and finer pieces. It is just half as old as John Pero's chalice, and only a "country cousin" to the rich vessel in

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[1]L.1023-184, lent by Mrs. John Emerson Marble. Height 12¾ inches, maker's mark *P.P.* Among laymen, the *tankard* was a drinking vessel for beer or ale. The *flagon,* which followed the same styles, was a taller vessel used on the church altar for sacramental wine.

[2]L.2104-6, lent by Mr. and Mrs. Harold C. Ramser. Of George Ist period, though in the earlier Queen Anne style which persisted through this and into the reign of George IInd. Chalice 6⅞ inches high, paten 4⅝ inches diameter, both engraved with the sacred monogram *IHS.* Maker, John Pero.

[3]A.5295.1-5, the gift of Mr. Nelson Eddy. Height of flagon 11 inches, of chalices 6⅛ inches. Compare flagons in J. B. Kerfoot's *American Pewter,* Figs. 238 (by Israel Trask) and 243 (by Eben Smith).

the Marble Collection. Calder's flagon of homely britannia metal, too sharply beaked and with too lightly poised a handle, must blush to recall its more boldly skirted silver ancestors of the 17th century, or its fine full-domed forebears of the early 18th.

But this is too harsh an introduction. Of its more humble kind, and for its much later time (the 1830's), our service is rare and outstanding. Comparable American flagons of this and the period shortly following have survived in fair numbers; but they are seldom found either of such pleasing design, or with their sets of matching chalices.

Calder's service belongs to what Mr. Kerfoot sweepingly called the "Coffee-Pot Period" in American pewtersmithing, when the "better men" were disappearing and when old handcraft methods were giving way to cheap quantity production. William Calder himself was "the last of the early Rhode Island pewterers." Yet here, at the very brink of that artistic benightment to follow, he gives us forms in simple good taste, and craftsmanship still of the old order.

The material used by Calder is britannia,[4] an alloy of tin introduced in the 18th century



Silver Chalice and Paten
John Pero: London, 1717-18

[4]The alloy was in variable proportions, but a good grade of britannia might run 100 parts tin to 6 of antimony, 2 of copper. Pewter usually contains some lead, with "common" pewter alloyed in the proportion of 4 parts tin to 1 of lead; but other metals (antimony, bismuth, zinc, or the alloys brass and copper) may also appear, and in the widest difference of combinations. As to all this, there is bewildering disagreement among authorities. Bradbury, for example, says that "old pewter *always* contains a certain percentage of lead," while Laughlin tells us that "lead was *not permitted* in fine pewter." On the whole, this matter is one to concern the chemist rather than the connoisseur. Laughlin reminds us that "there are few if any who can distinguish by sight or touch the best britannia from the best pewter of the same period."

as an improvement over pewter, the "poor man's silver." During the early 19th century, the pewtersmiths turned increasingly to britannia and away from pewter. Unfortunately, design and workmanship were deteriorating during this same period, so that collectors have wrongly come to associate the name *britannia* itself with work of inferior merit. Actually, though, britannia was a better alloy than pewter, and objects made of it commanded a higher price.

William Calder's day-book for the years 1826-38 is still in existence,[5] and from it much is to be learned. The name *britannia* occurs sparingly among the earlier entries in the day-book. Britannia and pewter are clearly distinguished, and with increasing mention of the former, during the years 1827-9. By 1830, britannia appears to have replaced pewter almost altogether.

The day-book first mentions flagons and church cups in 1830. Other church pieces—communion basins, christening bowls, communion beakers with a handle—formed a growing part of Calder's output all through the 1830's.

Something important is to be noticed here. As Mr. Raymond reminds us, "the demand for articles associated with church ceremonies obviously coincides with a period of church expansion into new, and poor, frontier communities."

Then perhaps it is for rich "association-values," in lieu of much intrinsic worth, that our service is chiefly to be prized. John Pero's expensive chalice and paten, gracing some tall-spired classic church in London, must seem not half so dear to Americans of a sentimental turn! To us, Calder's service—poor but proud—looks quite as "good" in some small, white-clapboarded Greek Revival meetinghouse of a new Midwestern village. We remember the worn hands that passed these easy-shaped chalices, on a winter's Sunday when one small ironplate stove scarcely took the chill off the small, bare-floored room. And the disparity between gleaming silver and grey britannia seems indeed not to matter very much.

WILLIAM CALDER

William Calder (1792-1856)[6] was born in Providence, where he was apprenticed to Samuel E. Hamlin. After his training was finished, he went to Philadelphia and worked for about a year. Returning then to Providence, he opened his own shop in January, 1817, and here he continued for nearly forty years. He was married (1) in 1818 and (2) in 1829.

Kerfoot, in his four Tables of Comparative Rarity (p. 218), lists William Calder as of "the second grade of rarity." The touchmark on our flagon, CALDER in an engrailed rectangle, is the one that about 1825 or soon thereafter supplanted the maker's earlier eagle touch (with *CALDER* above and *PROVID* below).

—Gregor Norman-Wilcox

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[5]Percy E. Raymond, *William Calder, a Transition Pewterer* (pp. 209-11 in the magazine ANTIQUES for November, 1936).

[6]Notes on the maker are from Ledlie Irwin Laughlin, *Pewter in America* (2 vols., 1940).



Parajulus lasti Pierce—
Crystallized millipede in basaltic lava, with crystalline quartz. Collected by General Carl F. A. Last, from a depth of 900 feet in a well at Oxnard, California.

THE SEARCH FOR FOSSIL INSECTS

NOTE—Before 1944, very few fossil anthropods from California were known. There had been recorded only one dragonfly, and two millipedes from caves, all from Shasta County; twenty species from the La Brea asphalt deposits at Los Angeles; and three species from the McKittrick tar-field. In the present article, as many as seventeen localities are listed as sources of California fossil anthropods. Hundreds of species are now in the writer's hands, awaiting determination and description.

Insects have existed on the earth since the Devonian Period, for possibly 350 million years or more, probably all developing from a single parent stock, since they agree today in all their basic structures and anatomy. During the course of their long history, many types arose, flourished, and completely perished; while others, like the dragonflies and cockroaches, have persisted down through all ages, differing in species but not in general ordinal features.

Fossil insects indicate that many structures have been tried out and have failed. Those characters which have survived through all time must have had great value in the survival of species. And since mankind finds its greatest competitor in the insect world, every lesson we can learn from the past history of this enormous group may be of value to us in the struggle for survival. Indeed, some very practical questions have been solved in our studies of the fossil insects from the asphalt excavations.

Moreover, in order better to understand the insects of today, and to classify them according to their hereditary relationships, the entomologist needs all the information he can obtain on the kinds of insects that existed long ago.

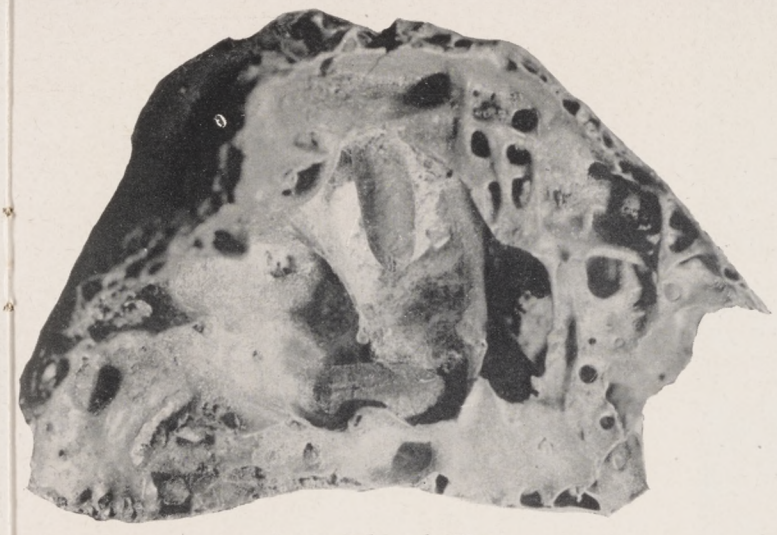
Insects are fragile creatures, and when crushed in the process of burial and preservation in the geological record they are usually reduced to thin, perishable objects in an unrecognizable state. On the other hand, some of the recent fossil discoveries on the Pacific Coast have produced entire beetle elytra in perfect preservation. Specimens occurring in oil shale are also sometimes complete, and with careful binocular dissection can be separated from the matrix. This is even more true of fossil insects recently obtained from a Quaternary lignite in British Columbia. Occasionally, we may split a piece of shale and expose a beautiful impression of an identifiable wing or body.

There are two kinds of preservation, however, in which the insect still retains its three-dimensional form. One of these occurs in balsam-like exudates, such as amber, in which the live insect became imprisoned. In course of time this gum or resin hardened, and insects captured in balsam may be found with all parts of their bodies held intact. The second such type of preservation is that occurring in asphaltum deposits, though here the insects are frequently found in a disintegrated state, with some of their parts badly disarranged. Three important deposits of this sort exist in California: (a) at Rancho La Brea, in Hancock Park, Los Angeles; (b) in a large deposit seen in cliff section along the ocean shore near Carpinteria, in Santa Barbara County; and (c) in exudations and impregnated sediments not far south of McKittrick, in Kern County.

Within the past three years, collectors have been active in bringing to the Museum many fossil insects, and known localities of their occurrence on the Pacific Coast have increased from 6 to 17. The following table summarizes the occurrence of fossil insects in California:

EPOCH	COUNTY	LOCALITY	TYPE OF MATRIX
Eocene	Shasta	Montgomery Creek	soft blush rock
Miocene	San Luis Obispo	Huasna Creek	oil shale
	Kern	Bellevue District	oil shale
	Ventura	Texas Oil Company	oil shale
	Los Angeles	Puente Hills	oil shale
		San Pedro	split rock
		San Pedro	diatomite
		Point Fermin	diatomite
	Santa Barbara	Santa Barbara	fossil wood
Pliocene	Orange	Lamb Community, North Newport	shale
Pleistocene	Shasta	Samwel Cave	crystal
		Potter Creek Cave	crystal
	Ventura	Oxnard	crystal
	Orange	Newport Estuary, site 66	beach deposit
	Los Angeles	Rancho La Brea	asphaltum
	Santa Barbara	Carpinteria	asphaltum
	Kern	McKittrick	asphaltum

Fossil insects are now known from at least six provinces in Canada and from 19 of the United States, the oldest species all being found in the Appalachian area.



Protochrysomyia howardae Pierce—
Puparia in a bone fragment of the giant bird *Teratornis merriami*. From Pleistocene tar deposit, at depth of 21½ feet. La Brea Pits, Los Angeles.

PALEOZOIC ERA

Our oldest American fossil insects come from the Upper Carboniferous or Pennsylvanian Period, according to some estimates from 225 to 270 million years old. The Altamonte Colliery, in the anthracite region of Pennsylvania, holds the record of having produced the oldest known insect, which has come to be called *Metropator pusillus Handlirsch.* This belonged to a very primitive group of winged forms believed to be the stem from which most of the modern orders are derived.

A second and later occurrence in the Pennsylvanian Period are the fossil materials found at six localities in New Brunswick. Of the two extinct orders of insects found here, one foreshadows the mayflies.

The earliest American cockroaches are found in the Upper Pottsville shales of the Pennsylvanian. Localities in Pennsylvania, Ohio and West Virginia have yielded ancestors of the dragonflies and grasshoppers. The true coal measures of the Pennsylvanian are rich in fossil insects representing groups still in existence, ancient cockroaches, mayflies and stoneflies. In addition, there appear the earliest American millipedes and relatives of the spider. This material comes from many localities, from Nova Scotia and Cape Breton Island, Arkansas and Oklahoma.

To find fossil insects in this material it is often necessary to split innumerable pieces of coal, and one is well rewarded if he finds a single specimen in an entire day's work. Only an enthusiast would collect under these circumstances, but it is surprising how many collectors there are in the world.

Rocks of the Permian Period, which in other parts of the world have yielded rich finds of insects, have furnished in North America only the remains of cockroaches and primitive dragonflies.

MESOZOIC ERA

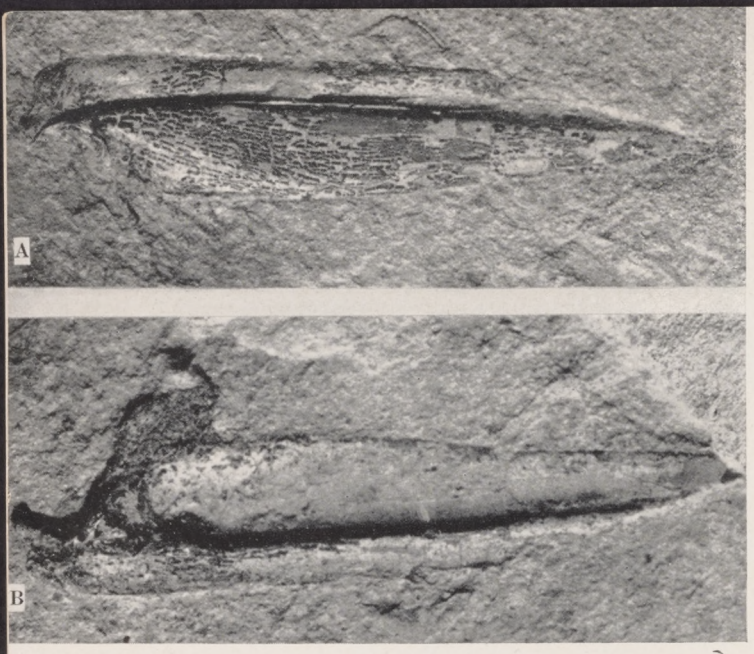
This great era, extending from about two hundred to sixty million years ago, is divided into three great Periods, but our American insect records are very few.

Fossil insect material is poorly represented in the Triassic, and some of the specimens considered as belonging to it by Hitchcock are questioned by Handlirsch, a former well-known authority on fossil insects. Definitely known specimens are a myriapod, larval insects from Turner's Falls, Massachusetts, and beetle borings in petrified wood from Petrified National Forest, Arizona.

While no remains of fossil insects have been found in the Jurassic, the succeeding period, the Cretaceous yields in addition to cockroaches, fossil insects of a modern order, as represented by beetles and lacewings.

CENOZOIC ERA

The Age of Mammals and modern plants began approximately sixty million years ago, and is divided into six epochs. From these epochs prior to Recent time have come fossil



Protosegestes lloydi Pierce—
Found in diatomaceous shale, at Cabrillo Beach, San Pedro, California. Upper Miocene.

insects belonging to ten modern orders: dragonflies, grasshoppers, earwigs, bugs, leaf hoppers, thrips, caddis flies, beetles, flies and wasps.

Oligocene insects are known from Wyoming and British Columbia and represent aphids, lacewings, flies, caddis flies, and bugs.

Miocene insects are found at several localities, but of particular interest are those from Florissant, Colorado. Twenty-four orders of insects are known from all available Miocene localities, representing spiders, whiptail scorpion, silverfish, dragonflies, snake flies, mayflies, scorpion flies, lacewings, grasshoppers, walking sticks, caddis flies, cockroaches, earwigs, termites, bugs, leaf hoppers, aphids, scale insects, psyllids, beetles, flies, wasps and ants.

Cores from California oil wells have contributed several discoveries from depths ranging from 2,105 to 10,450 feet. The paleontologist, in cracking the cores, occasionally finds a nice sample of a beetle wing (see *below*). The diatomite, or white shales, near the Marine Museum at San Pedro and on Point Fermin (see *above*) have furnished a few fossil insect wings. Remains of a whiptail scorpion were found in splitting the stratified rock on the shore at the Marine Museum. Another and better preserved whiptail scorpion, as yet undescribed, is in the San Diego Museum.

Beetle remains have been found in the Pliocene of California and in the postpliocene of Pennsylvania and Ontario. Interglacial Pleistocene lignite deposits in Canada have yielded beetles, a Lepidopterous pupa, and a psyllid wing. The lignite was accumulated in vast quantities in water, and apparently consisted of plant material.

Crystallized millipedes come from two Shasta County caves and from a 900-foot well at Oxnard, California (see p. 13). A crystallized Lepidopterous insect gall has been found in a marine shore deposit containing both land and marine forms, in a canyon near the head of Newport Bay Estuary, Orange County, California.

Last, but not least, are the marvelous asphalt deposits at Los Angeles, Carpinteria, and McKittrick. The McKittrick insect material was deposited in layers in the tar at the edge of an ancient lake, and so far, only Coleoptera have been found. In the Carpinteria

Aphelophlebodes stocki Pierce—
Wing of fossil mayfly, from an oil well core near Puente, California. From a depth of 2105-2127 feet, in Upper Puente shale, Mohnian Horizon, Upper Miocene.



material are Coleoptera, and the remains of termites, Isoptera. The Los Angeles tar pits have yielded hundreds of species of insects and their relatives, mostly yet to be described, belonging to the spiders, millipedes, centipedes, bugs, flies (see p. 15), ants and wasps, ground beetles, the tiger, diving, scavenger, carrion, skin and darkling beetles, long-horned wood borers, the dung, hister, and bark beetles, and weevils.

The material recovered from the asphalt consists of fragments or parts of insects. Dissected Recent insects are utilized for comparison, particularly in determining what parts of the fossil fragments relate to the same kind of insect. This is an infinitely tedious, yet interesting and highly rewarding task.

—W. Dwight Pierce

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